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ELECTRONICS SERVICE MANUAL

X-04 Receiver

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TELEDYNE ACOUSTIC RESEARCH

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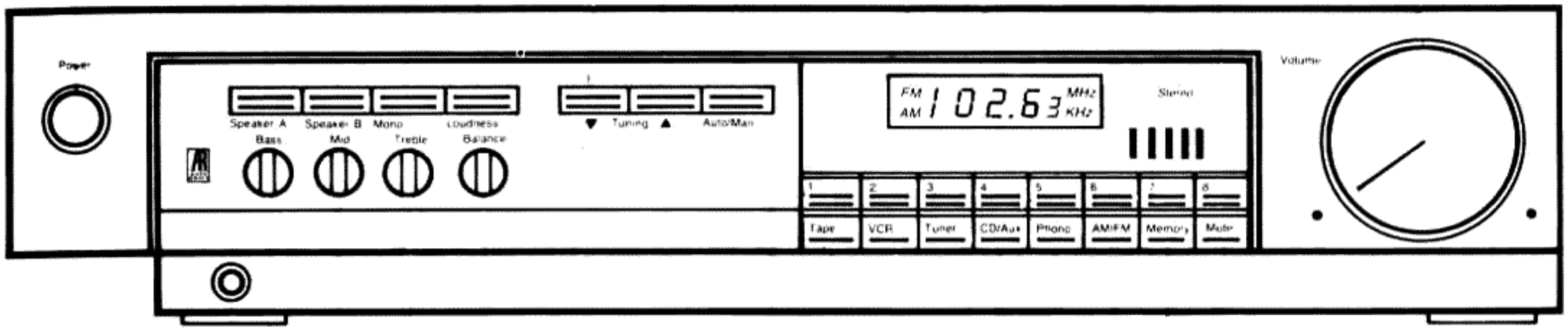
ACOUSTIC RESEARCH



FM IF, RF Alignment and FM MPX Alignment

Instruments: FM Signal Generator, (400Hz, 100% Modulated) T.H.D. analyzer, Oscilloscope, AC VTVM, DC Voltmeter, Tuning Meter
FM Stereo Generator, AC VTVM, Oscilloscope, Frequency Countor and THD Analizer

Terminated : DC Voltmeter...Between 4 and E5 On TH-IF-151 P.C.B. (Step 1.2)
Tuning Meter...Between TP1 and TP2 On TH-IF-151 P.C.B. (Step 8)

Step	Generator		Tuning Dial	Adjust	Adjust for
	Coupling	Frequency	Setting		
1	No use.		87.5 MHz	L105	1.4V reading on DC Voltmeter
2			108 MHz	CT103	9V reading on DC Voltmeter
3	Repeat steps 1 and 2 unit no further improvement is noticed.				
4	Antenna terminal	90 MHz	90 MHz	L101, L102 L104	Maximum reading on AC VTVM.
5				L104	Adjust balance of wave form
6		105 MHz	105 MHz	CT101, CT102	Maximum reading on AC VTVM.
7	Repeat steps 4.5 and 6 unit on further improvement is noticed				
8	Antenna terminal 1mV input	90 MHz	90 MHz	L106(A)	Adjusting center on Tuning Meter
9				L106(B)	Minimum reading on T.H.D. Analyzer
10	Repeat steps 8 and 9 unit no further improvement is noticed				
11	Antenna terminal 15μV input 10μV input (Europe)	90 MHz	90 MHz	VR 101	Muting Level (Auto Position)
12	Antenna trminal 1mV input	90 MHz	90 MHz	VR 102	Signal Indicator Level 5th LED light on
13	Antenna terminal 1mV input	98 MHz Pilot...10% 1 KHz...90% Mod.	98 MHz	VR 301	Best separation No need to Adjust VCO

AM IF and RF Alignment

Instruments: AM signal Generator (400Hz 30% Modulated), AC VTVM, Oscilloscope, DC Voltmeter
Terminated : DC Voltmeter "Between 4 and E5 ON TH-IF-151 P.C.B.

Step	Generator		Tuning Dial Setting	Adjust	Adjust for
	Coupling	Frequency			
1	No use.		530 KHz (531 KHz) Europe	L202	1.3V reading on DC Volt meter
2			1600 KHz (1602 KHz) Europe	CT202	9V reading on DC Volt meter
3	Repeat steps-1 and 2 unit no further improvement is noticed.				
4	Test Loop Radiate signal into loop antenna	450 KHz	530 KHz	L203	Maximum reading on AC VTVM.
5		600 KHz.	600 KHz	L201, L203	
6		1400 KHz	1400 KHz	CT201	
7	Repeat steps 5 and 6 unit no further improvement is noticed.				
8	Test Loop Radiate signal into loop ANT. 10mV input	1000 KHz	1000 KHz	VR201	Signal Indicator Lever 5th LED light on
9	Test Loop Radiate signal into loop ANT. 1mV input	1000 KHz	Auto Scanning	VR202	Stop Position

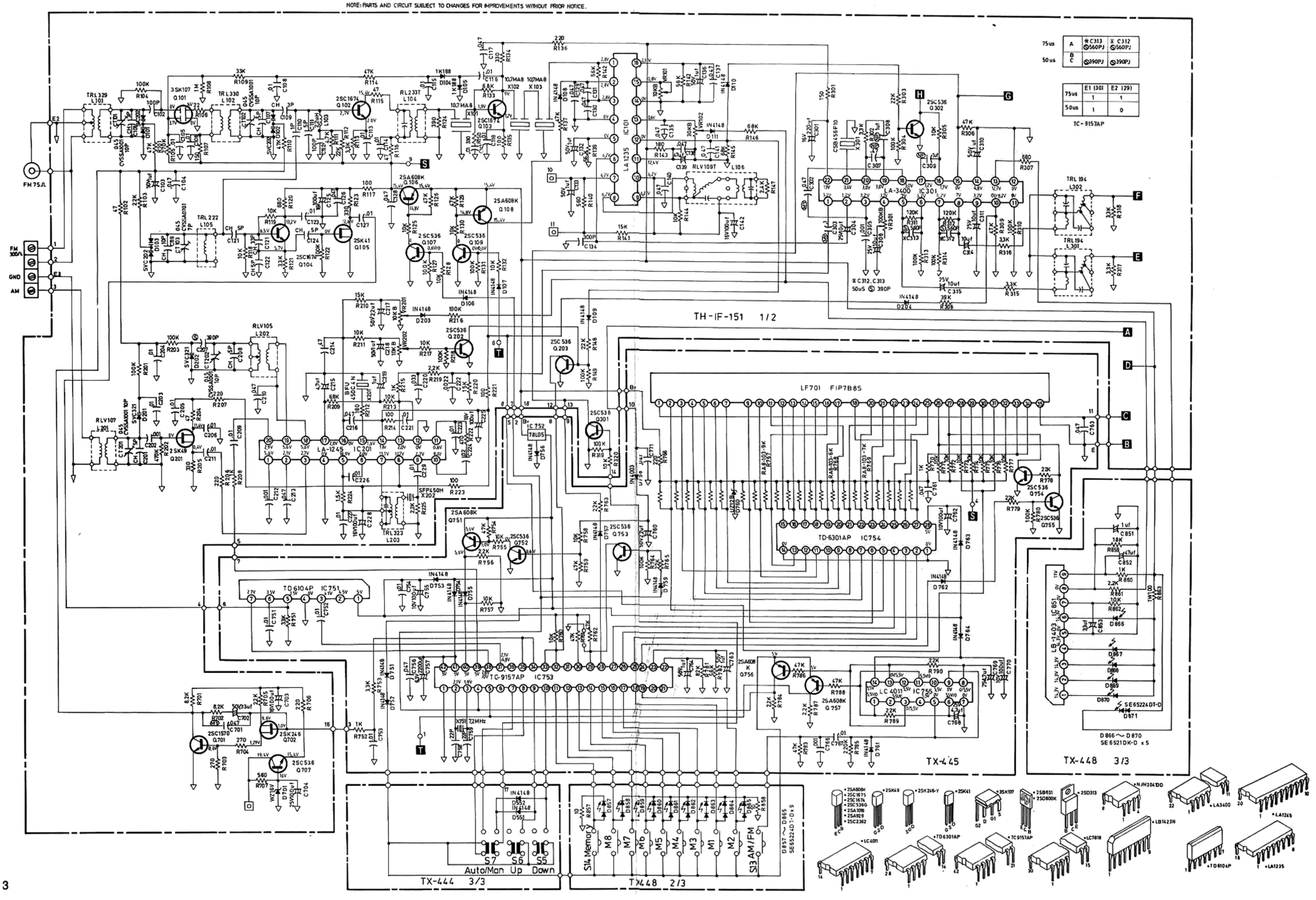
Bias Adjustment

Instruments: DC milli-voltmeter
Notes: Prior to Bias Adjustment, run about 5 minutes with rated output (8 ohm) and warm up Power Transistor and Heat Sink.
Set Volume Control to Mininum.

Step	Coupling		Adjust	Adjust for
	Plus Lead	Minus Lead		
1	TP 3	TP1	VR601	DC milli-voltmeter reads 4 mV
2	TP4	TP2	VR602	

Schematic Diagram 1/2

NOTE: PARTS AND CIRCUIT SUBJECT TO CHANGES FOR IMPROVEMENTS WITHOUT PRIOR NOTICE.



Schematic Diagram 2/2

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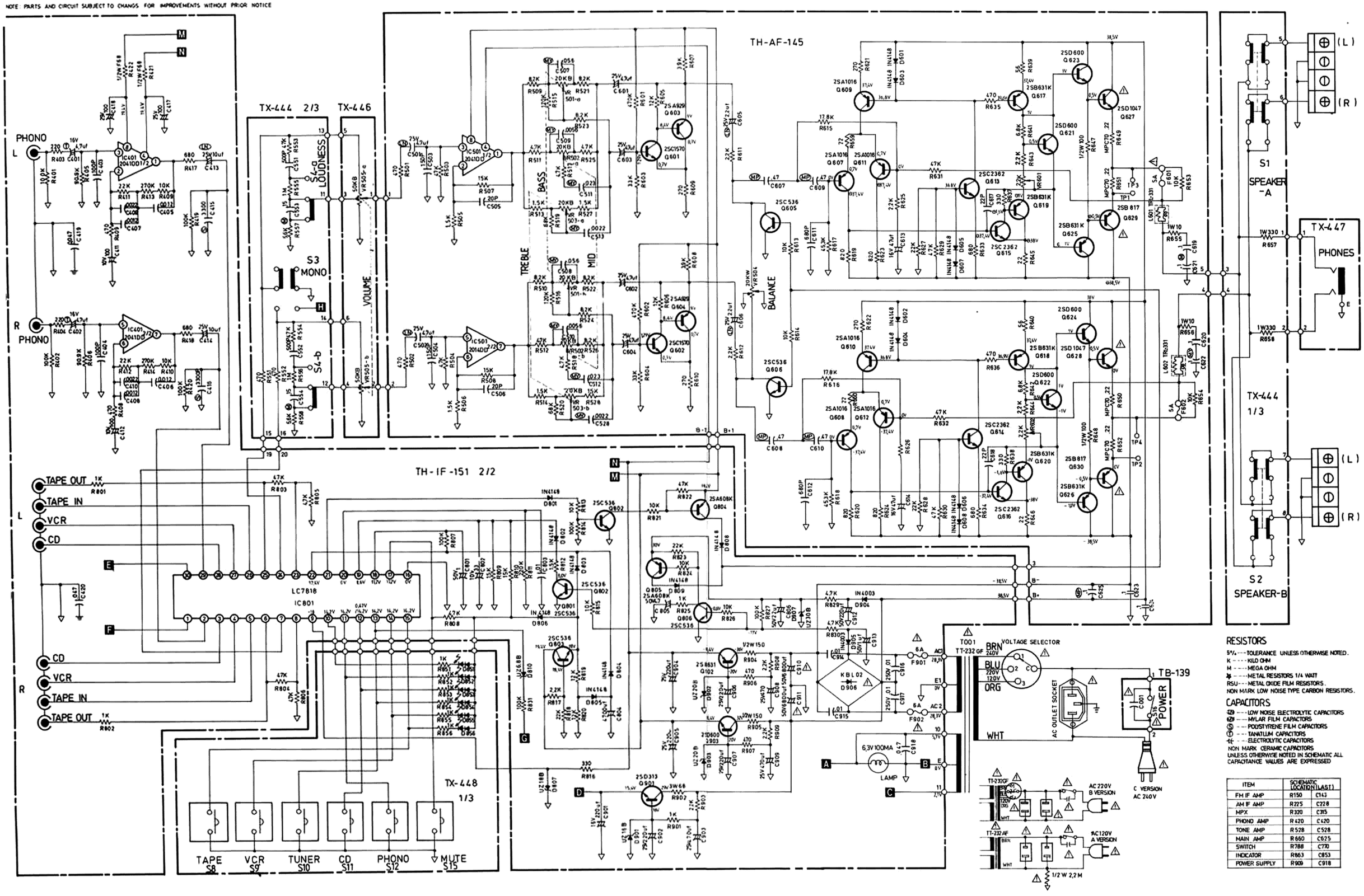


RESISTORS

5%---TOLERANCE UNLESS OTHERWISE NOTED.
K----KILO OHM
M----MEGA OHM
¼----METAL RESISTORS 1/4 WATT
RSU---METAL OXIDE FILM RESISTORS.
NON MARK LOW NOISE TYPE CARBON RESISTORS.

CAPACITORS

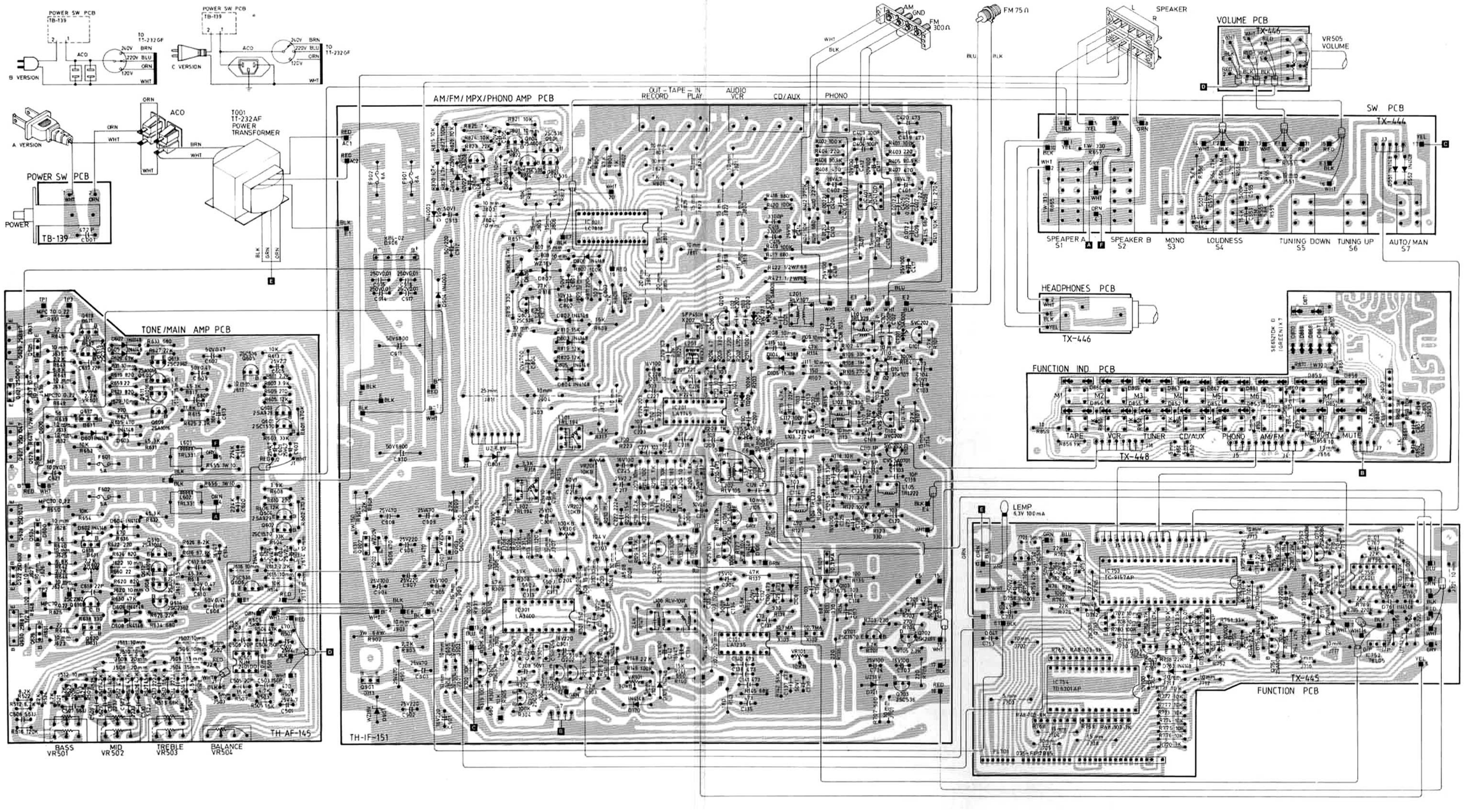
ⓐ----LOW NOISE ELECTROLYTIC CAPACITORS
ⓜ----MYLAR FILM CAPACITORS
Ⓢ----POLYSTYRENE FILM CAPACITORS
Ⓣ----TANALUM CAPACITORS
⊣⊢---ELECTROLYTIC CAPACITORS
NON MARK CERAMIC CAPACITORS
UNLESS OTHERWISE NOTED IN SCHEMATIC ALL CAPACITANCE VALUES ARE EXPRESSED

ITEM	SCHEMATIC LOCATION (LAST)	
FM IF AMP	R150	C143
AM IF AMP	R225	C228
MPX	R320	C315
PHONO AMP	R420	C420
TONE AMP	R528	C528
MAIN AMP	R660	C625
SWITCH	R788	C770
INDICATOR	R863	C853
POWER SUPPLY	R909	C918

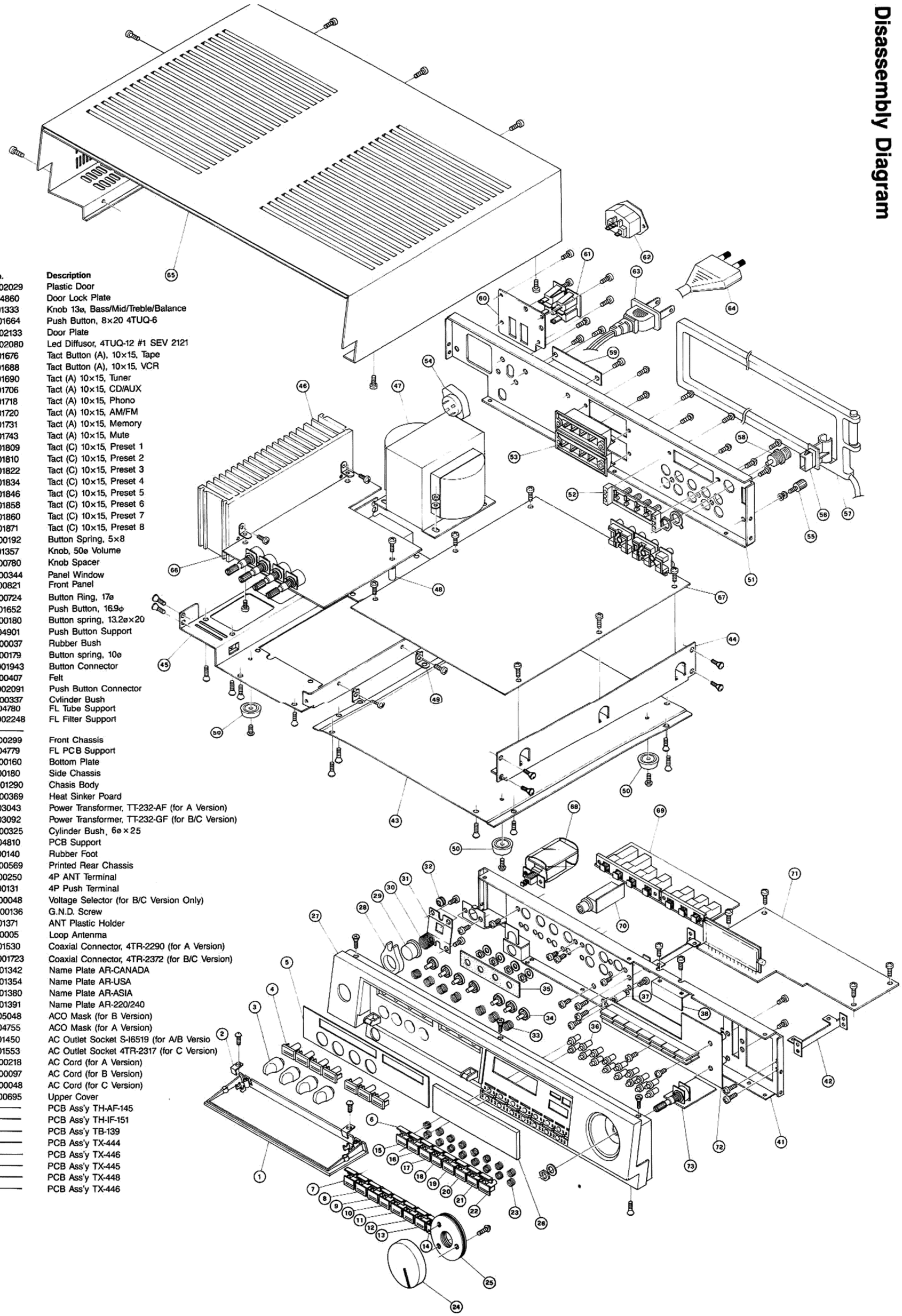
INSTRUCTIONS FOR SERVICE PERSONNEL

1). TO USE ONLY REPLACEMENT PARTS THAT HAVETHE CRITICAL CHARACTERISTICS RECOMMENDED BY MANUFACTURER.
2). TO MAKE LEAKAGE-CURRENT OR RESISTANCE MEASUREMENTS TO DETERMINE THAT EXPOSED PARTS ARE ACCEPTABLY INSULATED FROM THE SUPPLY CIRCUIT BEFORE RETURNING THE APPLIANCE TO THE CUSTOMER.

Wiring Diagram



Disassembly Diagram



Key No.	Pats No.	Description
1	OM00002029	Plastic Door
2	SP10004860	Door Lock Plate
3	KB10001333	Knob 13ø, Bass/Mid/Treble/Balance
4	KB20001664	Push Button, 8×20 4TUQ-6
5	OM00002133	Door Plate
6	OM00002080	Led Diffusor, 4TUQ-12 #1 SEV 2121
7	KB20001676	Tact Button (A), 10×15, Tape
8	KB20001688	Tact Button (A), 10×15, VCR
9	KB20001690	Tact (A) 10×15, Tuner
10	KB20001706	Tact (A) 10×15, CD/AUX
11	KB20001718	Tact (A) 10×15, Phono
12	KB20001720	Tact (A) 10×15, AM/FM
13	KB20001731	Tact (A) 10×15, Memory
14	KB20001743	Tact (A) 10×15, Mute
15	KB20001809	Tact (C) 10×15, Preset 1
16	KB20001810	Tact (C) 10×15, Preset 2
17	KB20001822	Tact (C) 10×15, Preset 3
18	KB20001834	Tact (C) 10×15, Preset 4
19	KB20001846	Tact (C) 10×15, Preset 5
20	KB20001858	Tact (C) 10×15, Preset 6
21	KB20001860	Tact (C) 10×15, Preset 7
22	KB20001871	Tact (C) 10×15, Preset 8
23	SN00000192	Button Spring, 5×8
24	KB10001357	Knob, 50ø Volume
25	SR00000780	Knob Spacer
26	AW00000344	Panel Window
27	AA80000821	Front Panel
28	BU00000724	Button Ring, 17ø
29	KB20001652	Push Button, 16.9ϕ
30	SN00000180	Button spring, 13.2ø×20
31	SP10004901	Push Button Support
32	BU00000037	Rubber Bush
33	SN00000179	Button spring, 10ø
34	OM00001943	Button Connector
35	FE00000407	Felt
36	OM00002091	Push Button Connector
37	BC00000337	Cylinder Bush
38	SP10004780	FL Tube Support
39	OM00002248	FL Filter Support
40	———	
41	AF80000299	Front Chassis
42	SP10004779	FL PCB Support
43	AB00000160	Bottom Plate
44	AS01000180	Side Chassis
45	AM00001290	Chasis Body
46	AH20000369	Heat Sinker Poard
47	PT23003043	Power Transformer, TT-232-AF (for A Version)
	PT23003092	Power Transformer, TT-232-GF (for B/C Version)
48	BC00000325	Cylinder Bush, 6ø×25
49	SP10004810	PCB Support
50	FT00000140	Rubber Foot
51	AR80000569	Printed Rear Chassis
52	TP20000250	4P ANT Terminal
53	TP10000131	4P Push Terminal
54	VC00000048	Voltage Selector (for B/C Version Only)
55	SW00000136	G.N.D. Screw
56	SA00001371	ANT Plastic Holder
57	LB01130005	Loop Antenna
58	SA00001530	Coaxial Connector, 4TR-2290 (for A Version)
	SA00001723	Coaxial Connector, 4TR-2372 (for B/C Version)
59	NP00001342	Name Plate AR-CANADA
	NP00001354	Name Plate AR-USA
	NP00001380	Name Plate AR-ASIA
	NP00001391	Name Plate AR-220/240
60	SP10005048	ACO Mask (for B Version)
	SP10004755	ACO Mask (for A Version)
61	SA00001450	AC Outlet Socket S-I6519 (for A/B Versio
62	SA00001553	AC Outlet Socket 4TR-2317 (for C Version)
63	CD00000218	AC Cord (for A Version)
	CD00000097	AC Cord (for B Version)
64	CD00000048	AC Cord (for C Version)
65	AU00000695	Upper Cover
66	———	PCB Ass'y TH-AF-145
67	———	PCB Ass'y TH-IF-151
68	———	PCB Ass'y TB-139
69	———	PCB Ass'y TX-444
70	———	PCB Ass'y TX-446
71	———	PCB Ass'y TX-445
72	———	PCB Ass'y TX-448
73	———	PCB Ass'y TX-446

Specification

Continuous Power Output.....40 watts per channel, min RMS both channels into 8 ohms from 20 to 10,000 Hz with no more than 0.03% total harmonic distrotion
DIN Power Output.....70 watts per channel (1 kHz, 4 ohms, 1% THD)
Music Power.....100 watts total (50 w/ch)
Total Harmonic Distrotion (20 to 20,000 Hz).....No more than 0.03%
Intermodulation Distrotion (60 Hz; 7 kHz = 4:1).....0.03%
Output
- **Speaker**..... 8 ohms nominal
- **Headphone**.....8 ohms nominal

Damping Factor.....80 (1 kHz, 8 ohm)
Input Sensitivity/Impedance
- **Phono**.....2.5 mV/47 kohms
- **Video Tape**.....150 mV/20 kohms

Overload Level (THD 0.5%, 1 kHz)
- **Phono**.....180 mV
- **Tape, CD Video**.....5V

Frequency Response
- **Phono**.....20 to 15 kHz ± 0.5 dB (RIAA STD)
- **Tape, CD Video**.....20 to 20 kHz ± 0.5 dB

Tone Control
- **Bass**..... ±6 dB (100 Hz)
- **Mid**..... ±6 dB (1 kHz)

Treble..... ±6 dB (10 kHz)
Loudness Control (Volume Set at 30 dB Position).. +5 dB (100 Hz), +3 dB (10 kHz)
Signal to Noise Ratio (IHF, A-Network)
- **Phono**.....75 dB
- **Tape, CD, Video**.....85 dB

FM Tuner Section
- **Usable Sensitivity**.....11.2 dBf/2.0 μV (mono)
- **DIN Sensitivity**.....1.2 μV (26 dB S/N 75 ohms)

50 dB Quieting Sensitivity
- **Mono**.....17.2 dBf/4.0 μ φ
- **Stereo**.....37.2 dBf/4.0 μV

Signal to Noise Rativ (at 65 dBf) IHF A Weighted
- **Mono**.....72 dB
- **Stereo**.....70 dB

Harmonic Distrotion (at 65 dBf) 30 Hz ~ 7.5 kHz
- **Mono**.....0.2%
- **Stereo**.....0.3%

Frequency Response.....± 0.5 dB (50 Hz ~ 10 kHz)
Capture Ratio.....1.5dB
Alternate Channel Selectivity.....65 dB (+400 kHz)
Spurious Response Ratio.....75 dB
Image Response Ratio.....40 dB
IF Response Ratio.....73 dB
AM Suppression Ratio.....55 dB
Stereo Separation.....40 dB (100 Hz ~ 10 kHz)
AM Tuner Section
- **Sensitivity**..... 40 dB
- **Sensitivity (Loop Antenna)**.....300 μV
- **Signal to Noise Ratio**.....50 dB
- **Image Response Ratio**.....40 dB
- **IF Response Ratio**.....40 dB
- **Power Consumption**.....200 watts
- **Dimension (Overall)**.....430(W) × 88(H) × 356(D)
  $16^{15}/_{16}" \times 3^{15}/_{32}" \times 14^{1}/_{16}"$
- **Weight (net)**.....9.9 kgs/21.78 lbs

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- **Tape, CD Video**.....20 to 20 kHz ± 0.5 dB

Tone Control
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- **Mid**.....±6 dB (1 kHz)

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